

KYUWIA, A NEW GENUS OF TRICHOGRAMMATIDAE (HYMENOPTERA) FROM AFRICA

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Abstract.—The new genus *Kyuwia* is described. It includes two new African species, *K. doutti* and *K. zuria*. Both species appear to be widespread in subsaharan Africa. Included are a key to species and a discussion of taxonomic placement.

Key Words: Hymenoptera, Trichogrammatidae, *Kyuwia*, new genus, new species, Africa

Examination of several recent collections of Trichogrammatidae from Africa has revealed the presence of an apparently widespread pair of species of a distinctive new genus, *Kyuwia*. Although numerous genera of Trichogrammatidae are known from Africa (Doutt and Viggiani 1968, Noyes 2001) *Kyuwia* is the first that appears to be restricted to that continent. Based on structure of the male genitalia the new genus is tentatively placed in the subfamily Oligositinae and tribe Chaetostichini. The two new species, *K. doutti* and *K. zuria*, appear to be widespread in subsaharan Africa and are at least partially sympatric. A key to species is included.

Terminology employed in the descriptions for most morphological traits follows Doutt and Viggiani (1968) and Gibson (1997). Terms of antennal sensilla follow, or are modifications of, those utilized for *Trichogramma* by Olson and Andow (1993) and Pinto (1999). Abbreviations used are as follows: APB = aporous sensillar trichodea B; PLS = sensilla placodea; BPS = basiconic peg sensilla; FS = flagelliform setae (Pinto 1999) or multiporous pitted sensilla trichodea A (Olson and Andow 1993); APA = aporous setae A (Olson and Andow 1993) or unsocketed setae (Pin-

to 1999). One type of antennal sensillum in *Kyuwia* not easily fitting standard terminology used for *Trichogramma* concerns a relatively dense patch of recurved sensilla on the ventral surface of the female antenna (Figs. 4–6). Similar structures were termed multiporous pitted sensilla trichodea C in *Trichogramma* (Olson and Andow 1993). Although similar in *Kyuwia*, these sensilla are not associated with a type C base (a shallow socket) but, as with the flagelliform setae (FS), have a type A basal insertion (sensillar surface contiguous with antennal surface). We refer to these structures simply as recurved setae (RS).

Kyuwia Pinto and George, new genus

Type species: *Kyuwia doutti* Pinto and George, n. sp.; present designation.

Diagnosis.—Flagellum of antenna with only four segments: two anelli and two asymmetrical club segments; funicle absent; club of female with a patch of light-colored, recurved setae (RS) ventrally. Fore wing relatively broad, ca. half as wide as long, densely setose, vein tracks inconspicuous. Male genitalia as in Chaetostichini (see Description).

Description.—Female. *Head*: Foramen magnum distant from mouthparts, at level

of dorsum of eyes; malar sulcus absent. Eyes and ocelli red. Toruli at same level as ventral margin of eyes. Antenna (Figs. 2–4) with only four flagellar segments: two anelli and two asymmetrical club segments. Antennal club segment 1 (C1) closely appressed to second segment (C2) and distinctly shorter, longest along dorsal surface; surface densely set with short unsocketed setae (APA); venter of C2 with a large light-colored patch of short, digitiform, recurved setae (RS). Mandible with 3 distinct teeth. Maxillary palp one segmented. *Mesosoma* (Figs. 11–12): Pronotum narrowly divided mediolongitudinally. Scutum and scutellum each with two pair of setae, without a mediolongitudinal line; propodeum strap-shaped, only slightly produced posteriorly at middle, medial length ca. $3\times$ that of metanotum; mesophragma notched apically; mesopleuron with pleural sulcus. Fore wing (Figs. 7, 9) ca $2\times$ as long as wide; disk densely covered with setae, vein tracks not evident or poorly indicated, with a field of minute alar acanthae posterior to premarginal vein on ventral surface; venation extending to ca. 0.5 wing length; marginal vein contacting anterior margin of wing, ca. $1.5\times$ length of premarginal vein; premarginal vein usually distinctly separated from marginal vein, angled away from wing margin resulting in a costal cell; stigmal vein distinct, angled toward wing apex, stigma suboval, connected to marginal vein by a constriction; a very short, obsolescent postmarginal vein visible or not. *Metasoma*: Sterna complete. Ovipositor shorter than hind tibia, often directed dorsally and almost perpendicular to frontal plane when at rest; hypopygium (Figs. 16–17) triangular, extending to apex of metasoma, with a distinct mediolongitudinal line.

Male (known only for type species). Similar to female except club without a ventral patch of recurved setae (RS). Genitalia (Fig. 15) of the Chaetostrichini type (Viggiani 1971): elements fused into a single tubular structure with a distinct and elongate anterodorsal aperture and without ob-

vious parameres or volsellae; genitalia widest at basal third, gradually narrowing to base and to apex.

Etymology.—An arbitrary combination of letters; derived from the letter 'Q', in keeping with 'Genus Q', the unofficial name originally used in our laboratory for this taxon. Gender feminine.

Host.—Unknown.

Discussion.—*Kyuwia* is distinguished from all other Trichogrammatidae by its unique antenna consisting of a club with two asymmetrical segments, absence of a funicle, and presence of a large ventral patch of light-colored recurved setae on the second club segment in females. The densely setose fore wing without distinct vein tracks also helps distinguish the genus.

Kyuwia is most likely to be confused with the virtually cosmopolitan *Aphelinoidea* Girault, which also has a densely setose fore wing, lacks a funicle and often has a two-segmented club (Doutt and Viggiani 1968). In fact, in the key to genera in Doutt and Viggiani (1968) *Kyuwia* runs to *Aphelinoidea* at couplet 34. In *Aphelinoidea*, however, the club segments are symmetrical, and a ventral patch of recurved setae is absent. Also the fore wing is considerably narrower (ca. $2.5\times$ as long as wide), has a short, poorly-defined stigmal vein, and the venation does not extend as far toward the wing apex (< 0.5 distance from base to apex). The antennal club of the South American *Pseudoxenufens* Yoshimoto, like that in *Kyuwia*, is composed of two asymmetrical segments, but in that genus a distinct funicle is present (Yoshimoto 1976).

Except for *Aphelinoidea*, all trichogrammatid genera lacking a funicle have more than two club segments; most are characterized by four or five. Only four of these genera have as few as three club segments. These include *Paruscanoidea* Girault, *Tumidiclava* Girault, *Tumidifemur* Girault, and *Uscanella* Girault. *Paruscanoidea* and *Uscanella* have virtually glabrous fore wings. *Tumidiclava* and *Tumidifemur* have densely setose fore wings but are distinguished



Fig. 1. *Kyuwia douiti*, female, habitus.

from *Kyuwia* by the same antennal features that separate *Aphelinoidea*. In addition, *Tumidiclava* females have a rodlike projection at the apex of the antenna which is lacking in *Kyuwia*. Of these genera, only *Tumidiclava* and *Aphelinoidea* are known from Africa.

The structure of the male genitalia currently places *Kyuwia* in the Chaetostrichini (Oligositinae) based on the classification of Viggiani (1971). However, it is distinct from all genera placed in the tribe and affinity to any of them is not clear. Other genera of Chaetostrichini include *Chaetostricha* Walker, *Gnorimogramma* DeSantis, *Bloodiella* Nowicki, *Brachista* Walker, *Lathrogramma* DeSantis, *Uscana* Girault, *Lathromeroidea* Girault, *Lathromeromyia* Girault, and *Uscanoidea* Girault (Viggiani 1971, 1984; Lin 1994; Pinto 1994). The latter six genera lack a funicle but have a 3–5 segmented club. *Kyuwia* and *Brachista* are the only genera placed in this tribe that have a patch of recurved setae on the ventral surface of the club in females. In *Brachista*, this feature only occurs in one

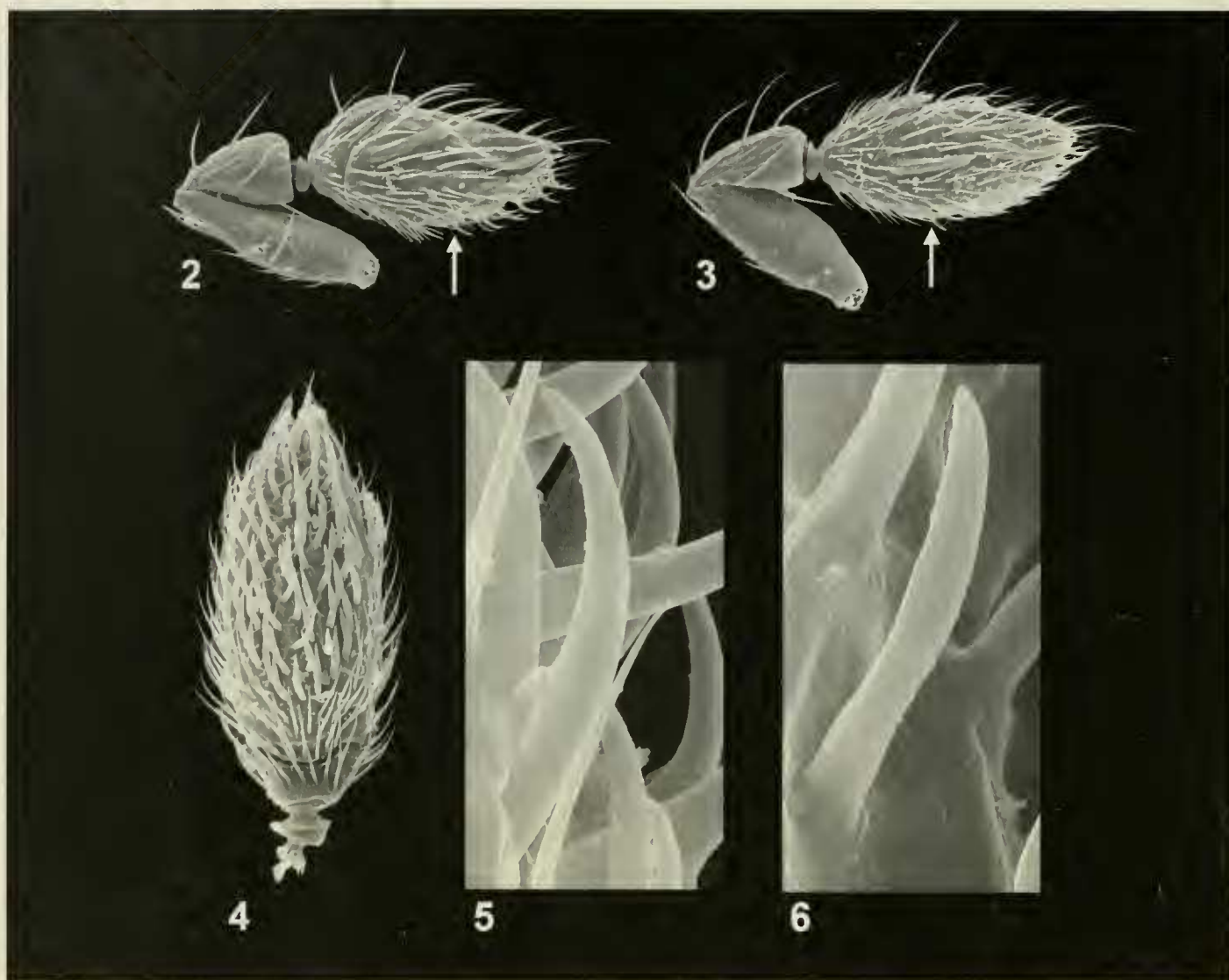
species, *B. fidiæ* (Ashmead) (Pinto 1994). This trait also occurs in several genera of Trichogrammatini (e.g., *Trichogramma* Westwood, *Trichogrammatoidea* Girault, *Trichogrammatomyia* Girault).

***Kyuwia douiti* Pinto and George,
new species**

(Figs. 1, 2, 5, 7, 8, 13, 15, 16)

Quantitative data for females represent means based on three specimens unless indicated; range provided only if noticeable variation detected (observed range for body length, sampled range for all other measurements); $n = 1$ for male.

Description.—Female (Fig. 1). Body length 0.65 (0.5–0.8) mm ($n = 5$), relatively robust with metasoma subtruncate apically, ca. twice as long as mesosoma. Color uniformly dark brown except as follows: head with vertex, parascrobal areas, and scrobal depression light brown to almost white, lower face, gena and postgena brown to dark brown; antenna with pedicel and scape very light brown, club noticeably darker; legs with tibiae and tarsi pale brown.



Figs. 2–6. Antennae of *Kyuwia*. 2, *K. doulti* (lateral; arrow near basal-most extension of recurved setal patch). 3, *K. zuria* (as in Fig. 2). 4, *K. zuria* (flagellum, ventral). 5, *K. doulti* (detail of recurved setae). 6, *K. zuria* (as in Fig. 5).

Head: ca. $0.8\times$ as long as wide, slightly wider than mesosoma; vertex slightly rounded; scrobes relatively shallow; malar space ca. $0.6\times$ lateral eye length. Antenna (Fig. 2) with scape widest in basal half; second anellus very short, closely appressed to club, expressed medially only; length/width of segments as follows: scape—2.6, pedicel—1.5, club—1.7; club $2.5\times$ and $1.2\times$ as long as pedicel and scape, respectively; C1 $0.3\times$ total length of club and closely appressed to C2; C2 $0.8\times$ ($0.8\text{--}0.9$) total length of club; C1 with two elongate APB, three PLS dorsally, and four subglobose BPS distributed along apex; C2 with 8 PLS, 3–4 BPS near base, and several relatively narrow and short FS; FS concentrated on

lateral surface; ventral patch of RS occupying apical 0.6 ($3/5$) of segment.

Mesosoma: Setation relatively long, setae on mesoscutum and scutellum of subequal length; scutum ca. $1.8\times$ as long as scutellum; dorsum with fine but distinct coriaceous sculpturing, cells generally wider than long anteriorly on scutum, more elongate posteriorly and on scutellum. Fore wing (Figs. 7–8) broad, suboblate, $0.51\times$ as wide as long, with fringe length ca. 0.15 greatest width, venation attaining 0.54 wing length; with a light brown infuscation posterior to marginal vein extending to stigmal vein and ca. half the distance to posterior wing margin; area posterior and basal to premarginal vein very lightly infuscate; the

two infusate areas separated by a narrow clear zone; disc setation apical to venation dense with relatively few vein tracks indicated; R, RS2 and RS1 tracks distinct, the latter represented by 4–5 setae and separated from adjacent disc setae by a narrow glabrous area; basal vein track of 1–3 setae; costal cell with 2–4 setae in anteroapical corner, setae divided between dorsal and ventral surfaces; marginal vein $1.5\times$ (1.4 – 1.6) as long as premarginal, both subequal in width; stigmal vein $0.45\times$ length of marginal vein; premarginal vein subrectangular with two long stout setae; marginal vein $4\times$ longer than wide with ca. 12 setae. Hind wing moderately broad, maximum width of disc $0.75\times$ length of longest posterior fringe setae; with three distinct vein tracks, 2–3 additional setae between posterior two tracks in some specimens. Legs relatively slender, relative length of coxa, trochanter, femur, tibia, tarsus and (tarsomeres) as follows: foreleg—34: 14: 48: 51: 41(12: 11: 20), middle leg—25: 16: 47: 66: 49(18: 14: 19), hind leg—50: 22: 61: 70: 55(18: 16: 23); mid tibial spurs (Fig. 13) relatively short, $0.72\times$ ($n = 5$) as long as first tarsomere.

Metasoma: Hypopygium (Fig. 16) triangular, longer than broad. Ovipositor $0.82\times$ as long as hind tibia.

Male. As in female except as follows: Antennal club similar in shape and segmentation but with fewer PLS (1 on C1, 4 on C2); C2 lacking a ventral patch of RS, with more elongate and conspicuous FS, lacking BPS sensilla near base, and with two elongate APA near middle. Legs more robust with considerably shorter tarsi, e.g. hind tarsus 0.5 hind tibial length (ca. $0.7\times$ hind tibial length in female); midtibial spur $0.9\times$ as long as first tarsomere. Last sternum with a distinct V-shaped emargination. Genitalia (Fig. 15) elongate, $1.1\times$ as long as hind tibia; anterodorsal aperture 0.45 total genitalic length.

Types.—Holotype ♀: TANZANIA, Morogoro, Sokoine University of Agriculture; viii-5/10-1994; J. LaSalle/J. Ismay, collrs.;

deposited in the collection of the Plant Protection Research Institute, Pretoria (PPRI). Paratypes: 2 ♀, same data as holotype except 1 ♀ vii-10-1994; 1 ♂, TANZANIA, Uluguru Mts., near Morogoro; viii-8-1994; J. LaSalle/J. Ismay, collrs.; in the collection of the Department of Entomology, University of California, Riverside (UCRC). All except 1 ♀ paratype mounted in Canada balsam on glass slides.

Etymology.—Named after Dr. Richard L. Doutt in recognition of his contributions to trichogrammatid systematics. Dr. Doutt apparently recognized *Kyuwia* to be distinct, as indicated by the note ‘n. genus’ written on slides of this species found in his collection at UC Berkeley.

Geographic distribution.—Subsaharan Africa from Ivory Coast south to South Africa.

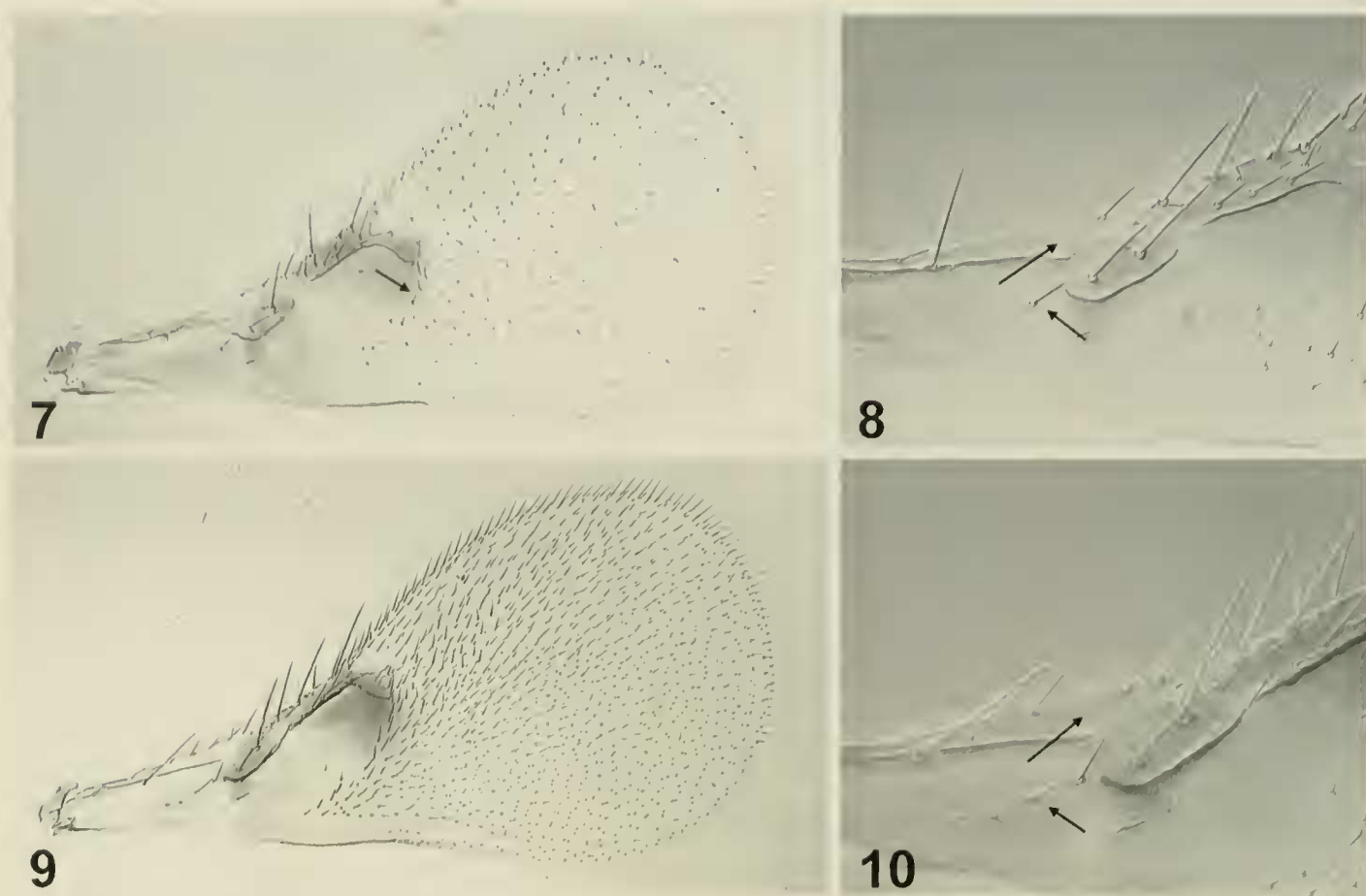
Material examined.—17 ♀, 1 ♂. IVORY COAST. Bouaké; i/x-1981, xii-1980; yellow pan trap in irrigated rice fields; 10 ♀; P. Cochereau. TANZANIA. 3 ♀, 1 ♂ (see Types). SOUTH AFRICA. Kruger National Park (Satara); xii-12/18-1995; 1 ♀; M. Sanborne. Pretoria; ii-1958; ex. suction trap; 2 ♀; D. Annecke. ZIMBABWE. Herare; Chishawasha; v-1990; Malaise trap; 1 ♀; A. Watsham.

Discussion.—A single female from Perinet, Madagascar (iv-26/v-4-1983; M. Day & J. Noyes, collrs.) is similar to *K. doutti* but probably represents a new species. Unlike in both *K. doutti* and *K. zuri*, the marginal and premarginal veins are contiguous in this specimen. Also, its marginal vein is slightly swollen and noticeably wider than the premarginal vein. This individual is labeled ‘nr. *Kyuwia doutti*’ in the U.C. Riverside Collection.

Kyuwia zuria Pinto and George, new species

(Figs. 3, 4, 6, 9–12, 14, 17)

Quantitative data represent means based on 5 specimens; range provided only if noticeable variation detected (observed range



Figs. 7-10. Fore wings of *Kynwia*. 7, *K. doulti* (arrow at RS1 vein track). 8, *K. doulti*, base of wing (top arrow at costal cell, bottom arrow at basal vein track). 9, *K. zuria*. 10, *K. zuria*, base of wing (arrows as in Fig. 8).

for body length, sampled range for all other measurements).

Description.—Female. As in *K. doulti* except as follows: Body length 0.67 (0.6–0.8) mm, head somewhat smaller relative to body; color generally lighter ventrally; mesosoma usually slightly lighter than metasoma (see Variation).

Head: Slightly narrower, as wide as mesosoma. Antenna (Figs. 3–4) with scape widest at middle; length/width of segments as follows: scape—2.6, pedicel—1.7, club 2.0; club 2.3× and 1.3× as long as pedicel and scape, respectively; C1 0.4× total club length, C2 0.9× total club length; patch of RS larger, occupying 0.8 (0.8–0.9) club length.

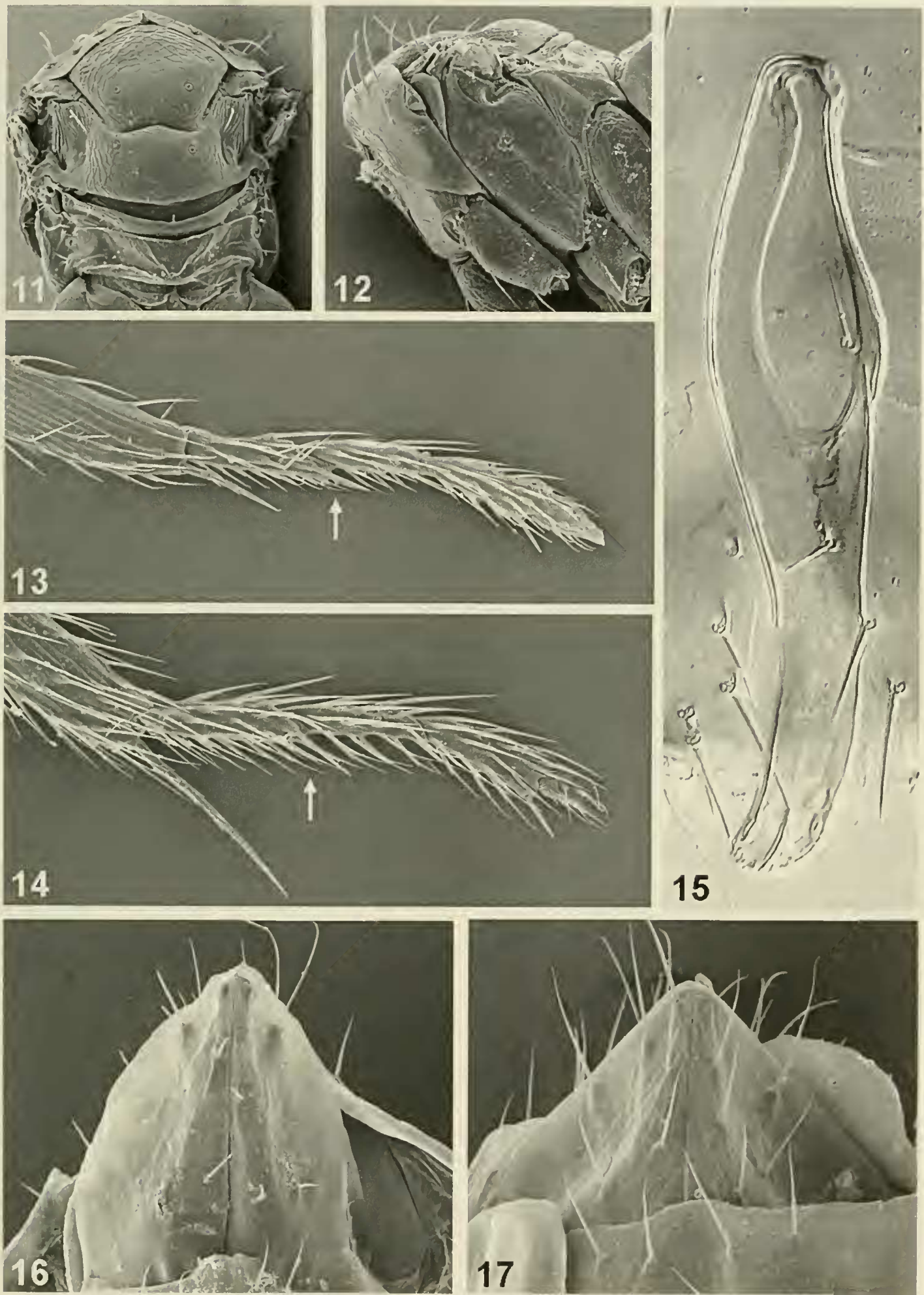
Mesosoma: Fore wing (Figs. 9–10) appearing somewhat longer; venation attaining 0.47 wing length; infuscations at base of wing darker; disc setation very dense, without distinct vein tracks, RS1 setae not distinguishable from adjacent disc setae;

basal vein track of 3–4 setae; costal cell with 9–11 setae, setae divided between dorsal and ventral surfaces. Hind wing with three vein tracks and a partial 4th track at middle between posterior two tracks; setae on disc longer. Legs with relative length of coxa, trochanter, femur, tibia, tarsus and (tarsomeres) as follows: foreleg—37: 18: 57: 56: 44(12: 14: 21), middle leg—27: 25: 54: 74: 55(17: 16: 24), hind leg—56: 21: 67: 81: 62(19: 19: 28); midtibial spur (Fig. 14) elongate, 1.36× (1.3–1.5) as long as first tarsomere.

Metasoma: Hypopygium (Fig. 17) triangular, broader than long. Ovipositor 0.79 (0.7–0.8) hind tibial length.

Male. Unknown.

Variation.—The dorsum of the mesosoma may be concolorous with the metasoma or considerably lighter. In most specimens the midlobe of the mesoscutum is only slightly lighter brown with the scutellum considerably more so. In specimens from



Figs. 11–17. *Kyuwia*. 11, Mesosoma, *K. zuria* (dorsal; scutal and scutellar setae broken off). 12, Mesosoma, *K. zuria* (lateral, anterior to left). 13, Middle leg (tarsus and apex of tibia), *K. doulti*, showing length of tibial spur relative to length of first tarsomere (arrow to apex of first tarsomere). 14, Middle leg, *K. zuria* (same as Fig. 13). 15, *Kyuwia doulti*, male genitalia (dorsolateral view; base at top). 16, Hypopygium, *K. doulti* (ventral). 17, Hypopygium, *K. zuria* (ventral).

Nelspruit, South Africa, this surface is yellow with two darker longitudinal maculae occupying the anterior $\frac{2}{3}$ of the midlobe. The limited material available suggests that color variation is continuous.

Types.—Holotype ♀: GHANA, Ashanti Region, Bobiri Forest Reserve; 06° 42'N, 01° 20'W; vii-23/31-2001; flight intercept trap; C. Carlton; deposited in the collection of the PPRI. Paratypes: 3 ♀, same data as holotype except viii-1/16-2001 (2 ♀ UCRC, 1 ♀ Canadian National Collection). All types mounted in Canada balsam on glass slides. Seven additional specimens from type locality card mounted (see below).

Etymology.—From ‘zuri’, the Swahili term for beautiful.

Geographic distribution.—Subsaharan Africa from Guinea east to Nigeria, south to South Africa.

Material examined.—42 ♀. GHANA. (see Types); 11 ♀; dates and data as for types except 1 specimen from ix-5/10-2001. GUINEA. Mt. Nimba (Gouan River); rainforest; 514 m; 7°42'N, 8°23'W; xi-27/30-1990, xi-29/xii-12-1990; flight intercept trap; 2 ♀; L. LeBlanc. Same as previous except: “514–740 m, 7°41' to 7°42'N, 8°23'W, xii-1990/iii-1991”; 1 ♀. IVORY COAST. Bouaké; i/x-1981; “pan traps in irrigated rice fields”; 10 ♀; P. Cochererau. Lamto Research Station; 6°13'N, 5°02'W; vii-1988; Malaise trap; 3 ♀. KENYA. Kakamega District; Ischeno (Kakamega Forest, Ischeno Nature Reserve); 1,800 m.; 00.24°N, 34.87°E; iv-19/30-2001; “Malaise in forest”; 1 ♀; R. Snelling. NIGERIA. Oyo State; Ibadan (IITA Compound); x-1987; yellow pan trap; 1 ♀; J. Noyes. SOUTH AFRICA. East Transvaal; Pilgrim’s Rest, 11 km SE; xii-11/31-1985; 1 ♀; S./J. Peck. Mpumalanga; Nelspruit Bushveld Lodge; 25°29.53'S, 30°55.91'E; ii-5/6-2002; yellow pan traps; 8 ♀; J. George/J. Kim. Mpumalanga; Nelspruit Lowveld National Botanical Gardens; 25°29.53'S, 30°38.15'E; ii-7-2002; yellow pan trap; 1 ♀; J. George. UGANDA. Fort

Portal; 20 km SE Makerere University Biological Field Station (MUBFS) (near Mikana stream); 1,530 m; 0°34.37'N, 30°21.66'E; x-7/21-2001; yellow pan-flight intercept trap; 2 ♀; B./J. Gill. Masindi District; Burdongo Forest (near Sonso); 1° 45'N, 31°35'W; vi-19/30-1995; “fogging *Trichilia rubescens* (Meliaceae)”; 1 ♀; T. Wagner.

Discussion.—*Kyuwia zuria* and *K. doutti* are similar species but can be distinguished by several characteristics. Differences associated with the fore wing and mesotibial spur length are summarized in the key to species. Also providing separation is the size of the RS patch on the ventral surface of the second club segment in females (Figs. 2–3). In *K. zuria* this patch of sensilla is more extensive, occupying the apical 0.8 of C2. In *K. doutti* it is restricted to the apical 0.6 of the segment. In addition to the size of the RS patch, the individual sensilla composing the patch also differ structurally. In *K. zuria* the sensilla are longitudinally ridged at the base and unevenly narrowed to the apex (Fig. 6), whereas in *K. doutti* they are relatively smooth basally and are evenly narrowed apically (Fig. 5). Also, the shape of the hypopygium differs (Figs. 16–17). Although triangular in both species, in *K. zuria* it is distinctly wider than long, whereas in *K. doutti* it is longer than wide. All differences noted are consistent throughout the range of both species. This includes representatives of each collected together at Bouaké, Ivory Coast.

KEY TO SPECIES OF *KYUWIA*
(based on females)

- 1. Mesotibia with apical spur elongate, distinctly longer than first mesotarsomere (Fig. 14). Fore wing setation extremely dense, RS1 track setae not distinguishable from adjacent disc setation (Fig. 9); costal cell with more than 8 setae (Fig. 10) *zuria*
- 1' Mesotibia with apical spur shorter than first mesotarsomere (Fig. 13). Fore wing setation less dense, RS1 track setae distinct, separated from adjacent disc setae by a narrow glabrous area (Fig. 7); costal cell with fewer than 5 setae (Fig. 8) *doutti*

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